Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Canceled)

1 ~~2~~. (Currently amended): A digital telemetry system having improved data rate and robustness, comprising:

a data transmission cable having a first end and a second end, and capable of transmitting data on at least two propagation modes;

a data source connected at the first end and having data transmission circuitry to generate data signals on the at least two propagation modes;

a receiver connected to the second end whereon the receiver receives signals on a first and second of at least two propagation modes and having

a processor connected to a storage medium storing instructions directing the processor to execute

an adaptive far-end cross-talk cancellation logic for canceling cross-talk that occurs between the first and second propagation modes, -wherein the adaptive far-end cross-talk cancellation logic comprises

a first propagation mode cross-talk adjustment logic to direct the processor to receive samples on ~~a~~ the first propagation mode and having a second propagation mode cross-talk adjustment logic to direct the processor to accept samples from ~~a~~ the second propagation mode wherein the first propagation mode cross-talk adjustment logic directs the processor to adjust

the samples on the first propagation mode by values that are a function of the samples of the second propagation mode; and

further comprises instructions to cause the processor to

determine a slice residual from the output of ~~the~~ each of the first and second mode cross-talk adjustment logics; and

update a cross-talk parameter from the slice residual.

3. (Canceled)

2 ~~4~~. (Currently amended): The digital telemetry system of Claim 1 ~~2~~, wherein the adaptive far-end ~~adaptive~~ cross-talk cancellation logic causes the processor to accept as input one value on each of a plurality of carriers and to compute the cross-talk component for each carrier.

3 ~~5~~. (Currently amended): The digital telemetry system of Claim 2 ~~4~~, wherein the adaptive far-end ~~adaptive~~ cross-talk cancellation logic directs the processor to compute the cross-talk component for each carrier by multiplying the signal received on the second propagation mode by a carrier specific coefficient.

4 ~~6~~. (Currently amended): The digital telemetry system of Claim 3 ~~5~~ further comprising ~~wherein~~ a far-end cross-talk parameter update logic ~~directs~~ directing the processor to update each carrier specific coefficient as a function of the slice residual on such carrier.

7. (Currently amended): A digital telemetry system having improved data rate and robustness, comprising:

a data transmission cable having a first end and a second end, and capable of transmitting data on at least two propagation modes;

a data source connected at the first end and having data transmission circuitry to generate data signals on the at least two propagation modes;

a receiver connected to the second end whereon the receiver receives signals on a first and second of at least two propagation modes and having

a processor connected to a storage medium storing instructions directing the processor to execute

an adaptive far-end cross-talk cancellation logic for canceling cross-talk that occurs between the first and second propagation modes,

wherein the adaptive far-end cross-talk cancellation logic comprises a first propagation mode cross-talk adjustment logic to direct the processor to receive samples on a first frequency domain equalizer on the first propagation mode and having a second propagation mode cross-talk adjustment logic to direct the processor to accept samples to a second frequency domain equalizer from ~~a~~ the second propagation mode wherein the first propagation mode cross-talk adjustment logic directs the processor to adjust the samples on the first propagation mode by values that are a function of the samples of the second propagation mode, and

~~further~~ wherein the far-end adaptive cross-talk cancellation logic causes the processor to accept as input one value on each of a plurality of carriers to a far-end cross-talk determination circuit and to compute the cross-talk component for each carrier by multiplying the signal received on the second propagation mode by a carrier specific coefficient for the far-end cross-talk determination circuit and to update each carrier specific coefficient by applying the ~~equation~~ following:

$$CXYi = CXYi + AlphaFEXT * (< CEXi, CEXi > / REF\_MAGN^2) * < TXFFT\_out[i], TYresidual[i] >$$

where

CEXi is the frequency domain equalizer coefficient of the first frequency domain equalizer for the ith carrier of propagation mode X;

CXYi is the carrier specific coefficient for the far-end determination circuit for ~~cross-talk cancellation coefficient for the ith carrier for~~ cancelling far-end cross-talk from the first propagation mode X to the second propagation mode Y;

AlphaFEXT is a constant for balancing the tracking speed of CXYi against the stability of the value of CXYi;

REF_MAGN is the Root Means Square (RMS) magnitude of CEXi;

TXFFT_out[i] is the frequency domain data point of the received sample on the ith carrier on propagation mode X;

TYresidual[i] is the slice residual for the ith data point on the Y propagation mode; and

$\langle\ \rangle$ is a complex scalar product defined as $\langle a+jb, c+jd\rangle=(a-jb)^*(c+jd)=(ac+bd)+j(ad-bc)$.

5 ~~8.~~ (Currently amended): The digital telemetry system of Claim ~~2~~ 1, wherein the ~~far-end~~ first propagation mode cross-talk adjustment logic directs the processor to receive *m* samples from the second propagation mode and convolve ~~these~~ the *m* samples using *m* coefficients.

6 ~~9.~~ (Currently amended): The digital telemetry system of Claim ~~8~~ 5, wherein the storage medium further stores instructions comprising ~~the~~ a slice determination logic and a coefficient update logic directing the processor to adjust the *m* coefficients as a function of ~~a~~ the slice residual determined by the slice determination logic.

8 ~~10.~~ (Currently amended): A digital telemetry system having improved data rate and robustness, comprising:

a data transmission cable having a first end and a second end, and capable of transmitting data on at least two propagation modes;

a data source connected at the first end and having data transmission circuitry to generate data signals on the at least two propagation modes;

a receiver connected to the second end whereon the receiver receives signals on a first and second of at least two propagation modes and having

a processor connected to a storage medium storing instructions directing the processor to execute

an adaptive far-end cross-talk cancellation logic for canceling cross-talk that occurs between the first and second propagation modes, the adaptive far-end cross-talk cancellation logic comprising a first propagation mode cross-talk adjustment logic to direct the processor to receive samples to a first linear adaptive equalizer on a first propagation mode and having a second propagation mode cross-talk adjustment logic to direct the processor to accept samples to a second linear adaptive equalizer from ~~a~~ the second propagation mode wherein the first propagation mode cross-talk adjustment logic directs the processor to adjust the samples on the first propagation mode by values that are a function of the samples of the second propagation mode,

wherein the ~~far-end~~ first propagation mode cross-talk adjustment logic directs the processor to receive *m* samples to a linear adaptive cross-talk determination logic from the second propagation mode and convolve ~~these~~ the *m* samples using *m* coefficients and the storage medium further stores instructions comprising a slice determination logic and a coefficient update logic directing the processor to adjust the *m* coefficients as a function of a slice residual determined by the slice determination logic using the ~~equation~~ following:

$$CXYi = CXYi + AlphaFEXT * (< CEXi, CEXi > / REF\_MAGN^2) * < TY_{(n-i)}, TXresidual >$$ where,

CEXi is the *ith* time domain equalizer coefficient of the first linear adaptive equalizer of the first propagation mode X;

CXYi is ~~the~~ an *ith* coefficient ~~cross-talk cancellation coefficient~~ for canceling far-end cross-talk of the linear adaptive cross-talk determination logic from the first propagation mode X onto the second propagation mode Y;

$TY_{(n-i)}$ is the $(n-i)th$ sample from the second propagation mode Y;

TXresidual is TXCorr - TXIdealPoint

where TXCorr is the cross-talk corrected output from ~~the cross-talk adjustment logic~~ a summer and TXIdealPoint is an ideal constellation point for the first propagation mode X; and

AlphaFEXT is a constant between 0 and 1;

REF_MAGN is the Root Means Square (RMS) magnitude of CEXi;

and

< > is a complex scalar product defined as <a+*j*b, c+*j*d>=(a-*j*b)*(c+*j*d)=(ac+bd)+*j*(ad-bc).

9 ~~11~~. (Currently amended): The digital telemetry system of Claim 8 ~~10~~, wherein AlphaFEXT is in the range from 0.00001 to 0.001.

12. (Canceled)

13. (Canceled)

14. (Canceled)

10 ~~15~~. (Currently amended) A method of digital telemetry having improved data rate and robustness by canceling far-end cross-talk from a near-lying propagation mode, comprising:

inputting a first sample received on a first propagation mode to a first frequency domain equalizer;

inputting a second sample received on a second propagation mode to a second frequency domain equalizer;

determining a slice residual;

determining a cross-talk component from the second sample on the first sample ;

adjusting a function used to determine the cross-talk component of a far-end cross-talk determination circuit as a function of the slice residual; and

determining an output by subtracting the cross-talk component from the second sample from the first sample, wherein the cross-talk component is determined by multiplying a carrier specific coefficient with a sample received on a corresponding carrier on the near-lying propagation mode and the coefficient~~s~~ is updated by applying the ~~function~~ following:

$$CXYi = CXYi + AlphaFEXT * (< CEXi, CEXi > / REF\_MAGN^2) * < TXFFT\_out[i], TYresidual[i] >$$

where

CEXi is the frequency domain equalizer carrier for the ith carrier of the first propagation mode X;

CXYi is the carrier specific coefficient for the far-end cross-talk determination circuit ~~cross-talk cancellation coefficient for the ith carrier~~ for canceling far-end cross-talk from the first propagation mode X to the second propagation mode Y;

AlphaFEXT is a constant for balancing the tracking speed of CXYi against the stability of the value of CXYi;

REF_MAGN is the Root Means Square (RMS) magnitude of ~~magnitude of~~ CEXi;

TXFFT_out[i] is the frequency domain data point on the ith carrier of the first propagation mode X;

TYresidual[i] is the slice residual for the ith data point on the second ~~Y~~ propagation mode Y; and

< > is a complex scalar product defined as <a+*j*b, c+*j*d>=(a-*j*b)*(c+*j*d)=(ac+bd)+*j*(ad-bc).

16. (Canceled)

17. (Canceled)

18. (Canceled)

19. (Currently amended) A method of digital telemetry having improved data rate or robustness by canceling far-end cross-talk from a near-lying propagation mode, comprising:

inputting a first set of samples received on a first propagation mode to a first linear adaptive equalizer;

inputting a second set of samples received on a second propagation mode to a second linear adaptive equalizer;

determining a cross-talk component by convolving the second set of samples, convolving comprising multiplying each sample in the second set of samples by a coefficient;

determining an output by subtracting the cross-talk component of a linear adaptive cross-talk determination logic from a first set of samples on the first propagation mode;

determining a slice residual between the output and an ideal point; and

adjusting the coefficients as a function of the slice residual by applying the ~~equation~~ <u>following</u>:

$$CXYi = CXYi + AlphaFEXT * (< CEXi, CEXi > / REF\_MAGN^2) * < TY_{(n-i)}, TXresidual >$$ where,

CEXi is the ith time domain equalizer coefficient for <u>the first</u> propagation mode X;

$TY_{(n-i)\cancel{j}}$ is the $(n\text{-}i)$ <u>set of</u> sample<u>s</u> from the second propagation mode Y;

TXresidual is TXCorr - TXIdealPoint

where TXCorr is the cross-talk corrected output from ~~the cross-talk adjustment circuit~~ <u>a summer</u> and TXIdealPoint is an ideal constellation point for <u>the first</u> propagation mode X;

AlphaFEXT is a constant between 0 and 1; and

< > is a complex scalar product defined as <a+*j*b, c+*j*d>=(a-*j*b)*(c+*j*d)=(ac+bd)+*j*(ad-bc).

12 ~~20~~. (Currently amended): The method of Claim ~~19~~ 11 wherein AlphFEXT is in the range <u>from</u> 0.00001 to 0.001.